USEPA (Brian Sanchez) Comments on the Draft Baseline Ecological Risk Assessment Work Plan
Columbia Falls Aluminum Company NPL Site
Columbia Falls, Montana
Responses Prepared for Columbia Falls Aluminum Company, LLC by Roux / EHS Support, LLC
Dated February 13, 2018

USEPA Comments in Black. Roux / EHS Support LLC responses in blue.

Site Background

1) Section 2.2.2.2. First sentence: "… constituents of potential concern…"

   The sentence in the Baseline Ecological Risk Assessment Work Plan (BERA WP) will be revised as indicated in the comment.

Risk Assessment Problem Formulation

1) Section 3.1, Dioxins and furans. Dioxins and furans should be evaluated based on their Toxic Equivalency (TEQ) levels for birds and mammals for the ecological risk assessment. Comparing levels to RSLs is not appropriate for an ecological risk assessment. The SLERA (p. 48) states: Potential ecological risks associated with exposure to dioxins, furans, and dioxin-like PCB congeners in soils in the Main Plant Area will also be conducted as part of the BERA in accordance with USEPA (USEPA, 2008).

   As indicated during the January 17, 2018 meeting/conference call with USEPA and MDEQ, ecological exposure to dioxins/furans measured in soil samples collected in the Main Plant Area will be evaluated as part of the constituent of potential ecological concern (COPEC) refinement in the Revised BERA WP based on the toxicity equivalency quotient (TEQ) approach (USEPA, 2008). Any additional dioxin/furan data collected during the Phase 2 Investigation will be evaluated based on the TEQ approach in the BERA Report. The risk characterization of dioxin/furan TEQs will consider the current and future availability of ecological habitat in the Main Plant Area where soil samples were collected.

   Please note, the reference to USEPA RSLs for dioxins/furans was in a general bulleted summary of the Phase 1 Site Characterization Report findings. The bullet will be removed to avoid confusion in the BERA WP.

2) Section 3.3.3. Suggest rewriting sentence beginning with "Smolders et al (2009)…". The sentence is confusing as written. Consider expanding statement so that the point is made more clearly.

   The sentence in Section 3.3.3. of the BERA WP will be revised to clarify the relevant point from the Smolders et al. (2009) study.

3) Section 3.3.6, Header: "Ecotoxicity of Constituents of Potential Concern"

   The header in the BERA WP will be revised as indicated in the comment.

4) Section 3.4.1.1. Screening COPECs against revised ESVs does not belong in a BERA work plan. If this approach is to be used in the BERA to describe uncertainties associated with these non-detect compounds, the sources for all ESVs in Table 1 should be cited.

The refinement of COPECs is consistent with Section 3.2 of Ecological Risk Assessment Guidance for Superfund (ERAGS) as part of the BERA Problem Formulation. Supplemental federal guidance on ecological risk assessment identifies COPEC refinement as an important step to focus the ecological risk assessment process (USEPA, 2015; TSERAWG, 2008; USEPA, 2000; U.S. Navy, 1999). In practice, COPEC refinement is often conducted as a refinement step in the SLERA intended to focus the BERA Problem Formulation. COPEC refinement was not included as part of the screening-level ecological risk assessment (SLERA) submitted for the Site; therefore, a refinement step was included in the BERA WP Problem Formulation to identify and focus further ecological risk analyses on COPECs that have the potential to drive ecological risk in the BERA.

Re-screening constituents based on refined Ecological Screening Values (ESVs) is a critical component of the COPEC refinement step given the conservative assumptions that were included in the SLERA screening process. For detected constituents with available ESVs, the SLERA identified COPECs based on maximum detected concentrations exceeding minimum ESVs. While this screening approach has a low probability of erroneously removing constituents that may pose an actual ecological risk, it is not indicative of COPECs that are likely to result in adverse ecological effects. Re-screening constituents based on refined ESVs that are protective of chronic exposure, but represent a broader range of no observed effect concentration (NOEC) endpoints, focuses further risk analysis on those COPECs that have greater potential to result in adverse ecological effects. The uncertainty in erroneously removing constituents from the BERA based on refined ESVs is limited to constituents with maximum concentrations that occur within the concentration range between the minimum ESV and refined ESV values. Given that minimum ESVs used in the SLERA and refined ESVs presented in the BERA WP are representative of chronic NOEC endpoints, there is a low probability that a constituent with a maximum concentration within this range will pose an actual ecological risk.

The BERA WP will be revised to indicate that COPEC re-screening conducted as part of the refinement step in the BERA Problem Formulation will include comparisons of maximum concentrations in samples collected in Phase 1 and Phase 2 to refined ESVs. All individual constituents included in analytical suites proposed in the Phase 2 Sampling and Analysis Plan (SAP), specifically metals, cyanide, fluoride, semi-volatile organic compounds (SVOCs), will be re-screened based on the combined Phase 1 and Phase 2 data for each exposure medium sampled within each exposure area. If a refined ESV is not derived for a constituent, the minimum ESV used in the SLERA screening will be used in the COPEC refinement in the BERA Problem Formulation. Given that there is a low probability that constituents with maximum concentrations within the range of minimum chronic NOEC ESVs and refined chronic NOEC ESVs pose an ecological risk, re-screening Phase 1 and Phase 2 data based only on the minimum ESVs presented in the SLERA will not materially reduce the uncertainty in selecting COPECs for further analysis in the BERA. Further, re-screening Phase 1 and Phase 2 data

based only on minimum ESVs will not effectively focus further risk analysis on those COPECs that have greater potential to result in adverse ecological effects, requiring an additional screening step based on refined ESVs. Therefore, it is proposed that COPEC re-screening conducted as part of the refinement step in the BERA Problem Formulation be streamlined to include only comparisons of maximum Phase 1 and Phase 2 concentrations to refined ESVs.

A table will be added to Appendix A (Table A-1) of the BERA WP that will include references to the sources of ESVs shown for the SLERA and BERA. A reference to the new Table A-1 will be added to the notes section for each screening table.

5) Section 3.4.1.1. Statement that "detection limits 2,4-dimehylphenol and 2,4-dinitrophenol were greater that minimum ESVs in nearly all samples" doesn't appear to be true. Based on Table 1, detection limits for all 515 samples were greater than the minimum ESV.

The sentence in the BERA WP will be revised to remove the word "nearly" to indicate that detection limits were greater than minimum ESVs in all 515 samples.

6) Section 3.4.3.1. Screening against revised ESVs does not belong in a BERA Work Plan. If revising ESVs is to be used to evaluate COPECs in the BERA, simply deriving new ESVs without a discussion of what values went into the derivation is not reasonable. Within Appendix A, there is no presentation of the data that went into deriving the refined ESVs.

Please refer to the response to Comment #4 regarding the use of revised ESVs as part of the COPEC refinement. The basis for developing revised ESVs was described for each exposure medium in Section 3.4.3 of the BERA WP. As indicated in the response to Comment #4, a table will be added to Appendix A (Table A-1) of the BERA WP that will include references to the sources of refined ESVs.

BERA Conceptual Design

1) Should the lack of dioxin/furan data at locations other than the Main Plant Area be considered a data gap? Is it possible that that dioxins/furans may have moved to other areas of the site in the plant's waste stream including the percolation ponds, ditches, etc. where they may be present in soil/sediments?

Additional sampling and analyses of dioxins/furans in soil around rectifier yard will be proposed as part of the Phase 2 investigation to evaluate potential migration pathways to adjacent areas.

2) Section 4.2.1.3. Recommend that risk also be evaluated on a point-by-point basis to account for potential exposure to small home range receptors.

As indicated during the January 17, 2018 meeting/conference call with USEPA and MDEQ and re-iterated during a follow-up conference call with USEPA on January 30, 2018, potential risk to small home range receptors will be evaluated on a point-by-point basis. Although wildlife receptors are not expected to obtain their daily dose from a single exposure point

concentration (EPC) at an individual sampling location, the evaluation of potential dietary exposure on a point-by-point basis will support a spatial evaluation of areas where small home range receptors may be exposed to dietary doses exceeding toxicity reference values (TRVs). Exposure to sedentary receptors, such as plants, soil invertebrates, benthic invertebrates, will also be conducted on a point-by-point basis.

As discussed during the follow-up conference call with USEPA on January 30, 2018, the evaluation of dietary exposure to small home range receptors will be based on estimated soil or sediment benchmark concentrations that are back-calculated from TRVs, consistent with the approach used to calculate USEPA Eco-SSL values (USEPA, 2005). Using the general exposure model presented on page 45 of the BERA WP, back-calculated soil or sediment benchmark concentrations will be calculated for each representative small home range receptor by setting the estimated daily dose (EDD) equivalent to the TRV and solving for the concentration in soil or sediment (C_{soil} or C_{sed}). Soil or sediment benchmarks will be calculated based on no observed adverse effect level (NOAEL) and lowest observed adverse effect level (LOAEL) TRVs. NOAEL- and LOAEL-based soil or sediment benchmarks will be compared on a point-by-point basis to soil or sediment data from relevant exposure intervals specified in the BERA WP (see Section 4.2.1.2). Comparisons of NOAEL- and LOAEL-based benchmarks to soil or sediment data from relevant exposure intervals will be presented visually within each exposure area to illustrate potential risk to small home range receptors. If exposure data exceed soil or sediment benchmarks, a hazard quotient (HQ, or ratio of EPC to benchmark concentration) will be presented visually to illustrate the magnitude of exceedance of the NOAEL- or LOAEL-based benchmark.

BERA Risk Analysis Plan

1) Section 5.1.1. NOEC values considered in the risk assessment should be the lowest NOEC value for a compound for a relevant test organism, not the geometric mean of NOEC values for relevant test organisms.

As discussed during the follow-up conference call with USEPA on January 30, 2018, a geometric mean of sublethal endpoints (e.g., growth, reproduction) for relevant test organisms will be used to estimate no observed effect concentrations (NOECs) and no observed adverse effect levels (NOAELs). The geometric mean estimates the central tendency of no effect endpoints without being unduly affected by extreme values within the dataset. A geometric mean is an appropriately conservative statistic to represent the NOEC/NOAEL endpoint because it estimates the center of the distribution of no effect exposure concentrations or doses. The lowest NOEC/NOAEL is the most conservative endpoint in the no effect distribution; however, the lowest no effect endpoint is not informative for understanding the potential threshold between no effects and effects distributions. Selecting the lowest NOEC/NOAEL does not consider the remaining no effect endpoints that exceed the lowest NOEC/NOAEL, yet are not associated with adverse effects.

The proposed use of the geometric mean is consistent with USEPA guidance for the derivation of Eco-SSLs (USEPA, 2005), as well as the approach USEPA recommended for the derivation of TRVs to evaluate wildlife ingestion pathways in the CFAC BERA (TechLaw, 2008). The

geometric mean of no effect endpoints has also been used in the derivation of consensus-based sediment quality guidelines (MacDonald et al., 2000).

When available, existing estimates of NOECs/NOAELs derived in the literature or guidance based on the geometric mean of no effect endpoints will be used in the BERA. If insufficient data are available or it is not warranted to derive a geometric mean-based NOEC/NOAEL, established NOECs/NOAELs from literature or guidance will be proposed.

2) Section 5.2.1. Agree with EPCs being calculated for each 1-acre grid where Incremental Soil Sampling results are available. Recommend adapting the approach for evaluating exposure to small home range receptors across the site by evaluating soil samples on a point-by-point basis.

As indicated in the response to BERA Conceptual Design Comment #2, exposure to small home range receptors will be evaluated on a point-by-point basis.

3) Section 5.2.3.2. Recommend including receptor-specific parameters (body weight, food ingestion rate, etc.) along with citations into an appendix.
Receptor-specific exposure parameters for each surrogate receptor will be summarized in an interim deliverable to USEPA prior to the initiation of dietary exposure modeling for the BERA. The BERA WP will be revised to note that this information will be submitted as an interim deliverable.

4) Section 5.2.3.3. Recommend including TRVs along with citations into an appendix.

Toxicity reference values (TRVs) will be summarized in an interim deliverable to USEPA prior to the initiation of dietary exposure modeling for the BERA. The BERA WP will be revised to note that this information will be submitted as an interim deliverable.

5) Table 1. Why is the median DL (0.135 mg/kg) for endrin in Table 1 is higher than its maximum DL (0.0022 mg/kg)?

The median value identified in the comment will be reviewed and revised, as necessary, in the BERA WP.

6) Table 4. This table indicates that dioxins/furans will be evaluated site wide, but dioxins/furan were only quantified in samples collected from the main plant area and the lack of dioxin/furan data was not identified as a data gap. How will dioxins/furan be evaluated site wide if there are no site wide data?

Please refer to the response to Risk Assessment Problem Formulation Comment #1 regarding the evaluation of dioxins/furans in the Main Plant exposure area. The BERA WP, including Table 4) will be revised to clarify this approach.

References:

USEPA. 2015. Region 4 Ecological Risk Assessment Supplemental Guidance. Interim Draft. U.S. EPA Region 4. August 2015.

USEPA. 2008. Framework for Application of the Toxicity Equivalence Methodology for Polychlorinated Dioxins, Furans, Biphenyls in Ecological Risk Assessment. USEPA/100/R-08/004. June 2008.

USEPA. 2005. Guidance for Developing Ecological Soil Screening Levels. OSWER Directive OSWER Directive 9285.7-55. February 2005.

USEPA. 2003 Ecological Risk Assessment Step 3A Refinement of Chemicals of Concern – Davis Timber Site. Lamar County, MS. Prepared by USEPA Region 4. December 2003.

USEPA. 2000. Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders. U.S. EPA Region 4.

Smolders, E., K. Oorts, P. Van Sprang, L. I. Schoeters, M. J. Mclaughlin. (2009). Toxicity of Trace Metals in Soil as Affected by Soil Type and Aging After Contamination: Using Calibrated Bioavailability Models to Set Ecological Soil Standards. Environmental Toxicity and Chemistry. 28:1633–1642.

TechLaw. 2008. Close-out Letter for Calculating Effect-based Ecological Soil Screening Levels for Fort Devens Ayers, MA. Memorandum from Stan Pauwels (TechLaw) to Bart Hoskins (USEPA Region I) dated November 18, 2008. TDF No. 1216, Task Order No. 26, Task No. 01.

TSERAWG. 2008. A Guide to Screening Level Ecological Risk Assessment. Tri-Services Environmental Risk Working Group (TSERAWG). TSERAWG TG-090801. September 2008.

U.S. Navy. 1999. Navy Policy for Conducting Ecological Risk Assessments. Office of the Chief of Naval Operations, Washington D.C.